

Inventions & Innovation Project Abstract

An Innovative Back Surface Reflector for High Efficiency Infrared Paper Drying

Creare proposes to develop a novel Back Surface Reflector (BSR) that will dramatically improve the efficiency, quality, and throughput of papermaking processes. Electric infrared (IR) dryers are typically used to drive moisture from the paper sheet prior to rolling or coating. These dryer units with present back surface reflector technology consume copious amounts of electrical power. For example, the electrical power input to a dryer frame on a single paper line at our partner's paper plant is nearly 5.8×10^6 Btu/hr (1700 kW). However, the dryers are plagued by a very low efficiency. Due to the poor performance of current BSRs, the amount of input power absorbed by the paper is only 10%, or approximately 5.8×10^5 Btu/hr (170 kW). Hence, more than 5.2×10^6 Btu/hr (1500 kW) of the input power supplied to the IR dryer is lost as waste heat. An improvement in the efficiency of the drying process is highly desired by our partner to increase quality, decrease energy costs, and increase throughput.

Creare's innovative BSR enables dramatic improvements in the efficiency of the drying process. Using its specialized knowledge of radiation heat transfer, design, manufacturing, and fabrication, it has constructed customized BSRs for this application. Using its innovation, the energy that is transmitted through the paper sheet will be absorbed in the Creare BSR and re-radiated toward the paper sheet much more efficiently than current inefficient BSRs. Creare's proof-of-concept testing has demonstrated that its innovation can achieve efficiency values as high as 30%; a 200% improvement over current technology. This increased efficiency could be used to improve the quality of the paper, decrease the amount of electrical energy required for drying, or increase throughput by increasing the speed of the paper sheet. During its past work, Creare has demonstrated the basic feasibility of our BSR concept, tested the performance of an IR dryer module from its partner's papermaking line, fabricated several samples of its novel BSR, and planned for an in-plant test to demonstrate the viability of the technology. During this project, its objective is to fabricate customized Creare BSRs for installation and testing in its industrial partner's papermaking facility, conduct in-plant tests, optimize the BSR design, and execute its commercialization plan for this technology. This plan involves partnering with an electrical furnace manufacturer.



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